UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EXPOSURE RESEARCH LABORATORY
HUMAN EXPOSURE & ATMOSPHERIC SCIENCES DIVISION (MD-46)
Research Triangle Park, NC 27711
919-541-2622

Office of
Research and Development

LIST OF DESIGNATED REFERENCE AND EQUIVALENT METHODS

Issue Date: **September 1, 1999**
(www.epa.gov/ttn/amtic/criteria.html)

These methods for measuring ambient concentrations of specified air pollutants have been designated as "reference methods" or "equivalent methods" in accordance with Title 40, Part 53 of the Code of Federal Regulations (40 CFR Part 53). Subject to any limitations (e.g., operating range) specified in the applicable designation, each method is acceptable for use in state or local air quality surveillance systems under 40 CFR Part 58 unless the applicable designation is subsequently canceled. Automated methods are acceptable for use at shelter temperatures between 20EC and 30EC and line voltages between 105 and 125 volts unless wider limits are specified in the method description.

Prospective users of the methods listed should note (1) that each method must be used in strict accordance with its associated operation or instruction manual and with applicable quality assurance procedures, and (2) that modification of a method by its vendor or user may cause the pertinent designation to be inapplicable to the method as modified. (See Section 2.8 of Appendix C, 40 CFR Part 58 for approval of modifications to any of these methods by users.)

Further information concerning particular designations may be found in the *Federal Register* notice cited for each method or by writing to the National Exposure Research Laboratory, Human Exposure and Atmospheric Sciences Division (MD-46), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. Technical information concerning the methods should be obtained by contacting the source listed for each method. Source addresses are listed at the end of the listing of methods, except for the addresses for lead method sources, which are given with the method. New analyzers or PM_{10} samplers sold as reference or equivalent methods must carry a label or sticker identifying them as designated methods. For analyzers or PM_{10} samplers sold prior to the designation of a method with the same or similar model number, the model number does not necessarily identify an analyzer or sampler as a designated method. Consult the manufacturer or seller to determine if a previously sold analyzer or sampler can be considered a designated method or if it can be upgraded to designation status. Analyzer users who experience operational or other difficulties with a designated analyzer or sampler and are unable to resolve the problem directly with the instrument manufacturer may contact EPA (preferably in writing) at the above address for assistance.

This list will be revised as necessary to reflect any new designations or any cancellation of a designation currently in effect. The most current revision of the list will be available for inspection at EPA's Regional Offices, and copies may be obtained by writing to the National Exposure Research Laboratory at the address specified above.

Most Recent Designations

BGI Inc. Model PQ200/PQ200A $PM_{2.5}$ Ambient Fine Particle Sampler, April 1998
Rupprecht & Patashnick, Inc. Partisol®-FRM Model 2000 PM-2.5 Air Sampler, April 1998
Rupprecht & Patashnick, Inc. Partisol®-Plus Model 2025 PM-2.5 Sequential Air Sampler, April 1998
Graseby Andersen Model RAAS2.5-100 $PM_{2.5}$ Ambient Air Sampler, June 1998
Graseby Andersen Model RAAS2.5-300 $PM_{2.5}$ Sequential Ambient Air Sampler, June 1998
Horiba Instruments, Inc. Model APSA-360/APSA-360-CE/APSA-360ACE Ambient SO_2 Monitor, June 1998
Advanced Pollution Instrumentation, Inc. Model 400A Ozone Analyzer, June 1998
DKK Corporation Model GLN-114E Nitrogen Oxides Analyzer, August 1998
Met One Instruments, Inc. Models BAM1020/1021-1, GBAM1020/1020-1 PM_{10} Beta Attenuation Monitors, August 1998
Thermo Environmental, Inc Model 605 “CAPS” Sampler, October 1998
BGI Inc. Models PQ100 and PQ200 PM_{10} Air Samplers, December 1998
Rupprecht & Patashnick, Inc. Partisol®-FRM Model 2000 PM-10 Air Sampler, December 1998
Rupprecht & Patashnick, Inc. Partisol®-Plus Model 2025 PM-10 Sequential Air Sampler, December 1998
Andersen Model RAAS2.5-200 PM2.5 Audit Air Sampler, March 1999
Rupprecht & Patashnick, Inc. Partisol® Model 2000 PM-2.5 Audit Sampler, April 1999
Andersen Models RAAS10-100, RAAS10-200, and RAAS10-300 Samplers, June 1999

NITROGEN DIOXIDE

Sodium Arsenite Method for NO_2 *Manual Equivalent Method:* **EQN-1277-026**
"Sodium Arsenite Method for the Determination of Nitrogen Dioxide in the Atmosphere"
[*Federal Register:* Vol. 42, page 62971, 12/14/77]

Sodium Arsenite Method for NO_2 - Technicon II *Manual Equivalent Method:* **EQN-1277-027**
"Sodium Arsenite Method for the Determination of Nitrogen Dioxide in the Atmosphere-Technicon II Automated Analysis System"
[*Federal Register:* Vol. 42, page 62971, 12/14/77]

TGS-ANSA Method for NO_2 *Manual Equivalent Method:* **EQN-1277-028**
"TGS-ANSA Method for the Determination of Nitrogen Dioxide in the Atmosphere"
[*Federal Register:* Vol. 42, page 62971, 12/14/77]

Advanced Pollution Instrumentation, Inc. Model 200 NO_2 Analyzer *Automated Reference Method:* **RFNA-0691-082**
"Advanced Pollution Instrumentation, Inc. Model 200 Nitrogen Oxides Analyzer," operated on a range of either 0-0.5 or 0-1.0 ppm, with a 5-micron TFE filter element installed in the rear-panel filter assembly, with either a user- or vendor-supplied vacuum pump capable of providing 5 inches mercury absolute pressure at 5 slpm, with either a user- or vendor-supplied dry air source capable of providing air at a dew point of 0EC or lower, with the following settings of the adjustable setup variables:

Adaptive Filter = *On*	PMT Temperature Set Point = *15EC*	Normal Filter Size = *12 samples*
Dwell Time = *7 seconds*	Rate of Change(ROC) Threshold = *10%*	Dynamic Span = *Off*
Sample Time = *8 seconds*	Reaction Cell Temperature = *50ºC*	Dynamic Zero = *Off*

and with or without any of the following options:

180 Stainless Steel Valves	283 Internal Zero/Span With Valves (IZS)	356 Level One Spares Kit
184 Pump Pack	325 RS-232/Status Output	357 Level Two Spares Kit
280 Rack Mount With Slides	355 Expendables	PE5 Permeation Tube for IZS

[*Federal Register:* Vol. 56, page 27014, 06/12/91]

Advanced Pollution Instrumentation, Inc. Models 200A/200AU NO_2 Analyzers *Automated Reference Method:* **RFNA-1194-099**
"Advanced Pollution Instrumentation, Inc. Models 200A and 200AU Nitrogen Oxides Analyzers," operated on any full scale range between 0-0.05 ppm and 0-1.0 ppm, with either a 1 or 5-micron TFE filter element installed in the filter assembly, with the following software settings: Dynamic Zero: OFF or ON; Dynamic Span: OFF; Cal-on-NO_2: OFF; Dilution Factor: 1.0; AutoCal: ON or OFF; Independent Range: ON or OFF; AutoRange: ON or OFF; Temp/Pres Compensation: ON; and with or without any of the following options: Rack Mount with Slides, Rack Mount without Slides, Ears Only, Rack Mount for External Pump without Slide Tray, Stainless Steel Zero/Span Valves, 4-20 mA Isolated Outputs, Digital Status Outputs, or RS-232 Outputs. **Model 200A only:** operated at any temperature in the range of 5 EC to 40 EC, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure no greater than 10 inches mercury at 1 slpm, Software setting Cal-on-NO2: OFF, with or without optional Internal Zero/Span with Valves (IZS) and Permeation Tubes for IZS. **Model 200AU only:** operated at any temperature in the range of 20 EC to 30 EC, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure no greater than 4 inches mercury at 1 slpm. [*Federal Register*: Vol. 59, page 61892,12/02/94]

Beckman Model 952-A $NO/NO_2/NO_x$ Analyzer *Automated Reference Method:* **RFNA-0179-034**
"Beckman Model 952-A $NO/NO_2/NO_x$ Analyzer," operated on the 0-0.5 ppm range with the 5-micron Teflon sample filter (Beckman P/N 861072 supplied with the analyzer) installed on the sample inlet line, with or without the Remote Operation Option (Beckman No. 635539). [*Federal Register:* Vol. 44, page 7806, 02/07/79]

Bendix Model 8101-B Oxides of Nitrogen Analyzer *Automated Reference Method:* **RFNA-0479-038**
"Bendix Model 8101-B Oxides of Nitrogen Analyzer," operated on a 0-0.5 ppm range with a Teflon sample filter installed on the sample inlet line and with the following post-manufacture modifications: 1) Ozone generator and reaction chamber input-output tubing modification per Bendix Service Bulletin 8101B-2; 2) The approved converter material; 3) The revised and EPA-approved operation and service manual. These items are mandatory and must be obtained from ABB Process Analytics. The analyzer may be operated with or without any of the following optional modifications: a. Perma Pure dryer/ambient air modification; b. Valve cycle time modification; c. Zero potentiometer centering modification per Bendix Service Bulletin 8101B-1; d. Reaction chamber vacuum gauge modification. [*Federal Register:* Vol. 44, page 26792, 05/07/79]

Bendix/Combustion Engineering Model 8101-C Oxides of Nitrogen Analyzer*Automated Reference Method:* **RFNA-0777-022**
"Bendix or Combustion Engineering Model 8101-C Oxides of Nitrogen Analyzer", operated on a 0-0.5 ppm range with a Teflon sample filter (Bendix P/N 007163) installed on the sample inlet line. [*Federal Register:* Vol. 42, page 37435, 07/21/77]

Columbia Scientific Industries Models 1600 and 5600 Analyzers *Automated Reference Method:* **RFNA-0977-025**
"CSI Model 1600 Oxides of Nitrogen Analyzer," operated on a 0-0.5 ppm range with a Teflon sample filter (CSI P/N M951-8023) installed on the sample inlet line, with or without any of the following options:

951-0103 Rack Ears
951-0104 Rack Mounting Kit (Ears & Slides)
951-0106 Current Output, 4-20 mA (Non-Insulated)
951-0108 Diagnostic Output Option
951-0111 Recorder Output, 10 V
951-0112 Remote Zero/Span Sample Control
951-0114 Recorder Output, 5 V
951-0115 External Pump (115 V, 60 Hz)
951-8072 Molybdenum Converter Assembly (Horizontal)
951-8074 Copper Converter Assembly (Horizontal)
951-8079 Copper Converter Assembly (Vertical)
951-8085 Molybdenum Converter Assembly (Vertical)

NOTE: The vertical molybdenum converter assembly is standard on all new analyzers as of 1-1-87; however, use of any of the other converter assemblies is optional. Also, the above options reflect new CSI part numbers.

"CSI Model 5600 Oxides of Nitrogen Analyzer," operated on a 0-0.5 ppm range, with any signal integration time in the range of 20 to 99 seconds, with a Teflon sample filter (CSI P/N M951-8023) installed on the sample inlet line, and with or without any of the following options:

954-0121Status Contacts
954-0122Input Solenoids
954-0125Current Output, 4-20 mA
964-0126Printer
954-8024Cartridge Dryer
954-0131 Rack Mounting Kit (ears and slides)
964-0012 Single Headed Pump - Gast
951-0115 Single Headed Pump - KNF

[*Federal Register:* Vol. 42, page 46574, 09/16/77]

Dasibi Model 2108 Oxides of Nitrogen Analyzer *Automated Reference Method:* **RFNA-1192-089**
"Dasibi Model 2108 Oxides of Nitrogen Analyzer," operated on the 0-500 ppb range, with software revision 3.6 installed in the analyzer, with the auto thumbwheel switch and the diag thumbwheel switch settings at 0, with the following internal CPU dipswitch settings:

switch	position	function
1	open (down)	Recorder outputs are NO & NO_2
5	open (down)	3 minute time constant
6	closed (up)	3 minute time constant;

with a 5-micron Teflon filter element installed in the filter holder, and with or without any of the following options:
Built-in Permeation Oven
Rack Mounting
Three-Channel Recorder Output
RS-232 Interface
4-20 mA Output
[*Federal Register:* Vol. 57, page 55530, 11/25/92]

DKK Corporation Model GLN-114E Nitrogen Oxides Analyzer *Automated Reference Method:* **RFNA-0798-121**
"DKK Corporation Model GLN-114E Nitrogen Oxides Analyzer," operated within a temperature range of 20 to 30 degrees C on any of the following measurement ranges: 0-0.050, 0-0.100, 0-0.200, 0-0.500, and 0-1.000 ppm
[*Federal Register*: Vol. 63, page 41253, 08/03/98]

Environnement S. A. Model AC31M NO Analyzer *Automated Reference Method:* **RFNA-0795-104**
"Environnement S. A. Model AC31M Chemiluminescent Nitrogen Oxide Analyzer," operated with a full scale range of 0 - 500 ppb, at any temperature in the range of 15EC to 35EC, with a 5-micron PTFE sample particulate filter, with the following software settings: Automatic response time ON; Minimum response time set to 60 seconds (RT ÷ 2); and with or without any of the following options: [2] Internal Permeation Oven; Connection for Silica Gel Dryer; RS232-422 interface; EV3 valve; Internal Printer.
[*Federal Register*: Vol. 60, page 38326, 07/26/95]

Horiba Instruments Model APNA-360 NO-NO_2-NO_X Monitor ***Automated Reference Method:*** **RFNA-0196-111**
"Horiba Instruments, Inc. Model APNA-360 Ambient NO-NO_2-NO_X Monitor," operated with a full scale range of 0 - 0.50 or 0 - 1.0 ppm, at any temperature in the range of 10 EC to 40 EC, with a Line Setting of "MEASURE", and an Analog Output of "MOMENTARY VALUE", and with or without the following options:[2] 1) Rack Mounting Plate and Side Rails 2) RS-232 Communications Port [*Federal Register*: Vol. 61, page 11404, 03/20/96]

Meloy Model NA530R Nitrogen Oxides Analyzer *Automated Reference Method:* **RFNA-1078-031**
"Meloy Model NA530R Nitrogen Oxides Analyzer," operated on the following ranges and time constant switch positions:

Range, ppm:	0-0.1[1]	0-0.25[1]	0-0.5	0-1.0
Time Constant Setting:	4	3 or 4	2,3, or 4	2,3, or 4

Operation of the analyzer requires an external vacuum pump, either Meloy Option N-10 or an equivalent pump capable of maintaining a vacuum of 200 torr (22 inches mercury vacuum) or better at the pump connection at the specified sample and ozone-air flow rates of 1200 and 200 cm^3/min, respectively. The analyzer may be operated at temperatures between 10EC and 40EC and at line voltages between 105 and 130 volts, with or without any of the following options: N-1A Automatic Zero And Span; N-2 Vacuum Gauge; N-4 Digital Panel Meter; N-6 Remote Control For Zero And Span; N-6B Remote Zero/Span Control And Status (Pulse); N-6C Remote Zero/Span Control And Status (Timer); N-9 Manual Zero/Span; N-10 Vacuum Pump Assembly (See Alternate Requirement Above); N-11 Auto Ranging; N-14B Line Transmitter; N-18 Rack Mount Conversion; N-18A Rack Mount Conversion [*Federal Register:* Vol. 43, page 50733, 10/31/78 and Vol. 44, page 8327, 02/09/79]

Monitor Labs Model 8440E Nitrogen Oxides Analyzer *Automated Reference Method:* **RFNA-0677-021**

"Monitor Labs Model 8440E Nitrogen Oxides Analyzer," operated on a 0-0.5 ppm range (position 2 of range switch) with a time constant setting of 20 seconds, with or without any of the following options:

TF- Sample Particulate Filter DO- Status Outputs 018A- Ozone Dry Air O18B- Ozone Dry Air - No Drierite With TFE Filter Element R- Rack Mount V- Zero/Span Valves FM- Flow meters

[*Federal Register:* Vol. 42, page 37434, 07/21/77; Vol. 42, page 46575, 09/16/77; Vol. 46, page 29986, 06/04/81]

Monitor Labs/Lear Siegler Model 8840 Nitrogen Oxides Analyzer *Automated Reference Method:* **RFNA-0280-042**

"Monitor Labs or Lear Siegler Model 8840 Nitrogen Oxides Analyzer," operated on a range of either 0-0.5 or 0-1.0 ppm, with an internal time constant setting of 60 seconds, a TFE sample filter installed on the sample inlet line, with or without any of the following options:

02 Flowmeter	08A Pump Pac Assembly With 09A (115 VAC)	011A Recorder Output 1 Volt
3A Rack Ears	08B Pump Pac Assembly With 09B (100 VAC)	011B Recorder Output 100 mV
03B Slides	08C Pump Pac Assembly With 09C (220/240 VAC)	011C Recorder Output 10 mV
05A Zero/Span Valves	08D Rack Mount Panel Assembly	012A DAS Output 1 Volt
05B Valve/Relay	09A Pump 115 VAC 50/60 Hz	012B DAS Output 100 mV
06 Status	09B Pump 100 VAC 50/60 Hz	012C DAS Output 10 mV
07A Input Power Transformer 100 VAC, 50/60 Hz	09C Pump 220/240 VAC 50 Hz	013A Ozone Dry Air
07B Input Power Transformer 220/240 VAC 50 Hz		013B Ozone Dry Air - No Drierite

[*Federal Register:* Vol. 45, page 9100, 02/11/80 and Vol. 46, page 29986, 06/04/81]

Monitor Labs/Lear Siegler Model 8841 Nitrogen Oxides Analyzer *Automated Reference Method:* **RFNA-0991-083**

"Monitor Labs or Lear Siegler Model 8841 Nitrogen Oxides Analyzer," operated on the 0-0.05 ppm[1], 0-0.1 ppm[1], 0-0.2 ppm[1], 0 - 0.5 ppm, or 0-1.0 ppm range, with manufacturer-supplied vacuum pump or alternative user-supplied vacuum pump capable of providing 200 torr or better absolute vacuum while operating with the analyzer. [*Federal Register:* Vol. 56, page 47473, 9/19/91]

Monitor Labs/Lear Siegler Models ML9841 or ML9841A, Monitor Labs Model ML9841B, or Wedding & Associates Model 1030 NO_2 Analyzers *Automated Reference Method:* **RFNA-1292-090**

"Lear Siegler Measurement Controls Corporation or Monitor Labs Models ML9841 or ML9841A, Monitor Labs Model ML9841B, or Wedding & Associates, Inc. Model 1030 Nitrogen Oxides Analyzers," operated on any full scale range between 0-0.05 ppm[1] and 0-1.0 ppm, at any temperature in the range of 15EC to 35EC, with the service switch on the secondary panel set to the *In* position; with the following menu choices selected: Range: *0.05 ppm* to *1.0 ppm*; Over-ranging: *Enabled* or *Disabled*; Calibration: *Manual* or *Timed*; Diagnostic Mode: *Operate*; Filter Type: *Kalman*; Pres/Temp/Flow Comp: *On*; Span Comp: *Disabled*; and as follows: **Models ML9841 and ML9841A** - with a five-micron Teflon® filter element installed internally, with the 50-pin I/O board installed on the rear panel configured at any of the following output range setting: Voltage, 0.1 V, 1 V, 5 V, 10 V; Current, 0-20 mA, 2-20 mA, 4-20 mA; and with or without any of the following options: Valve Assembly for External Zero/Span (EZS); Internal Zero/Span (IZS) Assembly for; Rack Mount Assembly; Internal Floppy Disk Drive. **Models ML9841B and 1030** - with a vendor-supplied or equivalent user-supplied five-micron Teflon® filter and exhaust pump, and with or without any of the following options: Valve Assembly for External Zero/Span (EZS); 50-pin I/O board; Internal Zero/Span (IZS) Assembly; Rack Mount Assembly; Charcoal exhaust scrubber; hinged, fold-down front panel. [*Federal Register:* Vol. 57, page 60198, 12/18/92]

Opsis Model AR 500 and System 300 Open Path Ambient Air Monitoring Systems for NO_2 *Automated Equivalent Method:* **EQNA-0495-102**

"Opsis Model AR 500 System" or "System 300" Open Path (long path) Ambient Air Monitoring Systems, configured for measuring NO_2, with one detector and movable grating, operated with a measurement range of 0 to 0.5 ppm, an installed monitoring path length between 50 and 500 meters (or 50 and 1000 meters with the ER 150 option, AR 500 System only), xenon lamp type B (150 watt), fiber optic cable length between 3 and 20 meters; operating within an ambient air temperature range of -50 to +50EC, an analyzer temperature range of 20 to 30EC, a measurement (integrating) time setting between 30 and 120 seconds (0 min:30 sec. to 2 min:00 sec.), and with a complete cycle time of not more than 200 seconds (3 min, 20 sec.). Under this method designation, the Model AR

500 System or System 300 consists of: AR 500 opto-analyser; emitter EM 110 and receiver RE 110 (together identified as ER 110); optic fibre cable OF60-S; power supply PS 150; OPSIS operational software, version 7.0 or 7.1; and initial on-site installation, setup, and limited operator training.[2]

Optional components that can be used with the Model AR 500 only, in addition to or as alternative to corresponding components listed above:

AR 503 opto-analyzer configured as Model AR 500 (only the center detector active, sequential monitoring)
Emitter/receiver ER 150 (for monitoring path lengths up to 1 kilometer)
Transceiver ER 130 and Retroreflector RE 090 with:
7 prisms (max. monitoring path length 150 meters) or
12 prisms (max. monitoring path length 250 meters)
Receiver RE 130
Xenon lamp type A (higher short-wavelength UV output)
Optic fibre cable OF60-R (low-loss for short wavelengths)
Multiplexers MX 004 and MX 024
Dataloggers DL 010 and DL 016
Analogue and digital input/output cards AO 008, AI 016, and DI 032
Analogue and digital isolation cards IA 008, ID 008, OA 008, and OD 008,
Window heaters HF 110 and HF 150
Mirror heaters HM 110 and HM 150
Auto calibration unit CU 007
Software packages IO 80 (for the analogue and digital input/output adapters), DL10 and DL16 (for data loggers), ComVision, and STAT 500;

Recommended calibration and accuracy audit components (or equivalent) for either Model AR 500 or System 300:

Wavelength calibration lamp CA 004
Calibration bench CB 100
Receiver unit RE 060 (two required)
Calibration unit CA 150, with same type lamp as used in the monitoring path emitter
Power supply PS 150 for calibration unit CA 150
Calibration cells CC 001-X, where X represents various cell lengths from 1 to 900 mm
Filter GG 400
Special calibration cells CC 110 or CC 150 (for mounting directly on receiver)
Light meter LM 010.

[*Federal Register*: Vol. 60, page 21518, 05/02/95]

Philips Model PW9762/02 $NO/NO_2/NO_x$ Analyzer *Automated Reference Method:* **RFNA-0879-040**

"Philips Model PW9762/02 $NO/NO_2/NO_x$ Analyzer," consisting of the following components: PW9762/02 Basic Analyzer; PW9729/00 Converter Cartridge; PW9731/00 Sampler or PW9731/20 Dust Filter; operated on a range of 0-0.5 ppm, with or without any of the following accessories: PW9752/00 Air Sampler Manifold; PW9732/00 Sample Line Heater; PW9011/00 Remote Control Set. [*Federal Register:* Vol. 44, page 51683, 09/04/79]

Thermo Electron/Thermo Environmental Instruments Model 14 B/E *Automated Reference Method:* **RFNA-0179-035**

"Thermo Electron or Thermo Environmental Instruments, Inc. Model 14 B/E Chemiluminescent $NO/NO_2/NO_x$ Analyzer," operated on the 0-0.5 ppm range, with or without any of the following options:

14-001 Teflon Particulate Filter
14-002 Voltage Divider Card
14-003 Long-Time Signal Integrator
14-004 Indicating Temperature Controller
14-005 Sample Flowmeter
14-006 Air Filter

[*Federal Register:* Vol. 44, page 7805, 02/07/79 and Vol.44, page 54545, 09/20/79]

Thermo Electron/Thermo Environmental Instruments Model 14 D/E *Automated Reference Method:* **RFNA-0279-037**

"Thermo Electron or Thermo Environmental Instruments, Inc. Model 14 D/E Chemiluminescent $NO/NO_2/NO_x$ Analyzer," operated on the 0-0.5 ppm range, with or without any of the following options: 14-001 Teflon Particulate Filter; 14-002 Voltage Divider Card. [*Federal Register:* Vol. 44, page 10429, 02/20/79]

Thermo Environmental Instruments Models 42, 42C $NO/NO_2/NO_x$ Analyzer *Automated Reference Method:* **RFNA-1289-074**

"Thermo Environmental Instruments Inc. Model 42 or Model 42C $NO\text{-}NO_2\text{-}NO_x$ Analyzer," operated on any measurement range between 0-50 ppb[1] and 0-1000 ppb, with any time average setting from 10 to 300 seconds, with temperature and/or pressure compensation on or off, operated at temperatures between 15 EC and 35 EC, with or without any of the following options: [2]

42-002Rack mounts
42-003Internal Zero/span and sample valves with remote activation
42-004 Sample/ozone flow meters (Model 42 only)
42-005 4-20 mA current output
42-006 Pressure transducer (Model 42 only)
42-007 Ozone particulate filter
42-008 RS-232/485 interface
42-009 Permeation dryer

[*Federal Register:* Vol. 54, page 50820, 12/11/89]

NO_2 - LEAD

NOTES

[1] Users should be aware that designation of this analyzer for operation on ranges less than the range specified in the performance specifications for this analyzer (40 CFR 53, Subpart B) is based on meeting the same absolute performance specifications required for the specified range. Thus, designation of these lower ranges does not imply commensurably better performance than that obtained on the specified range.

[2] This analyzer is approved for use, with proper factory configuration, on either 50 or 60 Hertz line frequency and nominal power line voltages of 115 Vac and 220 Vac.

Sources or Contacts for Designated Reference and Equivalent Methods

ABB Process Analytics
P.O. Box 831
Lewisburg, WV 24901
(304) 647-4358

Advanced Pollution Instrumentation, Inc.
6565 Nancy Ridge Drive
San Diego, CA 92121-2251
(619) 657-9800

Andersen Instruments
500 Technology Court
Smyrna, GA 30082-9211
(800) 241-6898

ASARCO Incorporated
3422 South 700 West
Salt Lake City, UT 84119
(801) 262-2459

Beckman Instruments, Inc.
Process Instruments Division
2500 Harbor Blvd.
Fullerton, CA 92634
(714) 871-4848

Bendix
[Refer to ABB Process Analytics]

BGI Incorporated
58 Guinan Street
Waltham, MA 02154

Columbia Scientific Industries
11950 Jollyville Road
Austin, TX 78759
(800) 531-5003

Combustion Engineering
[Refer to ABB Process Analytics]

Dasibi Environmental Corp.
506 Paula Avenue
Glendale, CA 91201
(818) 247-7601

DKK Corporation
4-13-14 Kichijoji Kitamachi,
Musashino-shi
Tokyo, 180, Japan

Environnement S.A
111, bd Robespierre
78300 Poissy, France
Instruments also available from:
Altech/Environnement U.S.A.
7206 Impala Drive
Richmond, VA 23228
(804) 262- 4447
kchaffee@altechusa.com

Environics, Inc.
69 Industrial Park Rd. E.
Tolland, CT 06084-2805
(203) 429-0077

Graseby GMW
[Refer to Andersen Instruments]

Horiba Instruments Incorporated
17671 Armstrong Avenue
Irvine, CA 92714
(800) 446-7422

Lear Siegler
[Refer to Monitor Labs, Inc.]

Commonwealth of Massachusetts
Department of Environmental
Quality Engineering
Tewksbury, MA 01876

Met One Instruments, Inc.
1600 Washington Blvd.
Grants Pass, OR 97526

McMillan
[Refer to Columbia Scientific Industries]

Mine Safety Appliances
600 Penn Center Blvd.
Pittsburgh, PA 15235-5810
(412) 273-5101

Monitor Labs, Inc.
74 Inverness Drive
Englewood, CO 80112-5189
(800) 422-1499

Opsis AB, Furulund, Sweden
Instruments also available from:
Opsis, Inc.
146-148 Sound Beach Avenue
Old Greenwich, CT 06870
(203) 698-1810

State of Oregon
Department of Environmental Quality
Air Quality Division
811 S.W. Sixth Avenue
Portland, OR 97204

PCI Ozone Corp.
One Fairfield Crescent
West Caldwell, NJ 07006
(201) 575-7052

Phillips Electronic Instruments, Inc.
85 McKee Drive
Mahwah, NJ 07430

Rupprecht & Patashnik Co.,Inc.
25 Corporate Circle
Albany, NY 12203
(518) 452-0065

Thermo Environmental Instruments, Inc.
8 West Forge Parkway
Franklin, MA 02038
(508) 520-0430

U.S. EPA
National Exposure Research Laboratory
Human Exposure & Atmospheric
Sciences Division
MD-46
Research Triangle Park, NC 27711
(919) 541- 2622

Wedding and Associates, Inc.
[Refer to Thermo Environmental Instruments, Inc.]

U.S. EPA REFERENCE & EQUIVALENT METHODS FOR AMBIENT AIR

September 1, 1999

Method	Designation Number	Method Code
SO_2 Manual Methods		
Reference method (pararosaniline)	--	097
Technicon I (pararosaniline)	EQS-0775-001	097
Technicon II (pararosaniline)	EQS-0775-002	097
SO_2 Analyzers		
Advanced Pollution Instr. 100	EQSA-0990-077	077
Advanced Pollution Instr. 100A	EQSA-0495-100	100
Asarco 500	EQSA-0877-024	024
Beckman 953	EQSA-0678-029	029
Bendix 8303	EQSA-1078-030	030
Columbia Scientific Industries 5700	EQSA-0494-095	095
Dasibi 4108	EQSA-1086-061	061
DKK Corp, Model GFS-32	EQSA-0701-115	
115		
Environnement S.A. AF21M	EQSA-0292-084	084
Horiba Model APSA-360/APSA-360ACE	EQSA-0197-114	114
Lear Siegler AM2020	EQSA-1280-049	049
Lear Siegler SM1000	EQSA-1275-005	005
Lear Siegler or Monitor Labs ML9850, Monitor Labs ML9850B, Wedding 1040	EQSA-0193-092	092
Meloy SA185-2A	EQSA-1275-006	006
Meloy SA285E	EQSA-1078-032	032
Meloy SA700	EQSA-0580-046	046
Monitor Labs 8450	EQSA-0876-013	513
Monitor Labs or Lear Siegler 8850	EQSA-0779-039	039
Monitor Labs or Lear Siegler 8850S	EQSA-0390-075	075
Opsis AR 500, System 300 (open path)	EQSA-0495-101	101
Philips PW9700	EQSA-0876-011	511
Philips PW9755	EQSA-0676-010	010
Thermo Electron 43	EQSA-0276-009	009
Thermo Electron 43A or Thermo Environmental Instruments 43B, 43C	EQSA-0486-060	060
O_3 Analyzers		
Advanced Pollution Instr. 400/400A	EQOA-0992-087	087
Beckman 950A	RFOA-0577-020	020
Bendix 8002	RFOA-0176-007	007
Columbia Scientific Industries 2000	RFOA-0279-036	036
Dasibi 1003-AH,-PC,-RS	EQOA-0577-019	019
Dasibi 1008-AH	EQOA-0383-056	056
Environics 300	EQOA-0990-078	078
Environnement S.A. $O_3$41M	EQOA-0895-105	105
Horiba APOA-360	EQOA-0196-112	112
Lear Siegler or Monitor Labs ML9810, Monitor Labs ML9810B, Wedding 1010	EQOA-0193-091	091
McMillan 1100-1	RFOA-1076-014	514
McMillan 1100-2	RFOA-1076-015	515
McMillan 1100-3	RFOA-1076-016	016
Meloy OA325-2R	RFOA-1075-003	003
Meloy OA350-2R	RFOA-1075-004	004
Monitor Labs 8410E	RFOA-1176-017	017
Monitor Labs or Lear Siegler 8810	EQOA-0881-053	053
Opsis AR 500, System 300 (open path)	EQOA-0495-103	103
PCI Ozone Corp. LC-12	EQOA-0382-055	055
Philips PW9771	EQOA-0777-023	023
Thermo Electron or Thermo Environmental Instruments 49, 49C	EQOA-0880-047	047
CO Analyzers		
Advanced Pollution Instr. 300	RFCA-1093-093	093
Beckman 866	RFCA-0876-012	012
Bendix 8501-5CA	RFCA-0276-008	008
Dasibi 3003	RFCA-0381-051	051
Dasibi 3008	RFCA-0488-067	067
Environnement s.a. CO11M	RFCA-0995-108	108
Horiba AQM-10, -11, -12	RFCA-1278-033	033
Horiba 300E/300SE	RFCA-1180-048	048
Horiba APMA-360	RFCA-0895-106	106
Lear Siegler or Monitor Labs ML9830, Monitor Labs ML9830B, Wedding 1020	RFCA-0992-088	088
MASS - CO 1 (Massachusetts)	RFCA-1280-050	050
Monitor Labs 8310	RFCA-0979-041	041
Monitor Labs or Lear Siegler 8830	RFCA-0388-066	066
MSA 202S	RFCA-0177-018	018
Thermo Electron or Thermo Environmental Instruments 48, 48C	RFCA-0981-054	054
NO_2 Manual Methods		
Sodium arsenite (orifice)	EQN-1277-026	084
Sodium arsenite/Technicon II	EQN-1277-027	084
TGS-ANSA (orifice)	EQN-1277-028	098
NO_2 Analyzers		
Advanced Pollution Instr. 200	RFNA-0691-082	082
Advanced Pollution Instr. 200A	RFNA-1194-099	099
Beckman 952A	RFNA-0179-034	034
Bendix 8101-B	RFNA-0479-038	038
Bendix 8101-C	RFNA-0777-022	022
Columbia Scientific Indust.1600, 5600	RFNA-0977-025	
025		
Dasibi 2108	RFNA-1192-089	089
DKK Corp GLN-114E	RFNA-0798-121	121
Environnement S.A. AC31M	RFNA-0795-104	104
Horiba APNA-360	RFNA-0196-111	111
Lear Siegler or Monitor Labs ML9841, ML9841A, Monitor Labs ML9841B, Wedding 1030	RFNA-1292-090	090
Meloy NA530R	RFNA-1078-031	031
Monitor Labs 8440E	RFNA-0677-021	021
Monitor Labs or Lear Siegler 8840	RFNA-0280-042	042
Monitor Labs or Lear Siegler 8841	RFNA-0991-083	083
Opsis AR 500, System 300 (open path)	EQNA-0495-102	102
Philips PW9762/02	RFNA-0879-040	040
Thermo Electron or Thermo Environmental Instruments 14B/E	RFNA-0179-035	035
Thermo Electron or Thermo Environmental Instruments 14D/E	RFNA-0279-037	037
Thermo Environmental Instr. 42, 42C	RFNA-1289-074	074
Pb Manual Methods		
Reference method (hi-vol/AA spect.)	--	803
Hi-vol/AA spect. (alt. extr.)	EQL-0380-043	043
Hi-vol/Energy-disp XRF (TX ACB)	EQL-0783-058	058
Hi-vol/Energy-disp XRF (NEA)	EQL-0589-072	072
Hi-vol/Flameless AA (EMSL/EPA)	EQL-0380-044	044
Hi-vol/Flameless AA (Houston)	EQL-0895-107	107
Hi-vol/Flameless AA (Omaha)	EQL-0785-059	059
Hi-vol/ICAP spect. (Doe Run Co.)	EQL-0196-113	113
Hi-vol/ICAP spect. (EMSL/EPA)	EQL-0380-045	045
Hi-vol/ICAP spect. (Illinois)	EQL-1193-094	094
Hi-vol/ICAP spect. (Kansas)	EQL-0592-085	085
Hi-vol/ICAP spect. (Montana)	EQL-0483-057	057
Hi-vol/ICAP spect. (NE&T)	EQL-1188-069	069
Hi-vol/ICAP spect. (New Hampshire)	EQL-1290-080	080
Hi-vol/ICAP spect. (Pennsylvania)	EQL-0592-086	086
Hi-vol/ICAP spect. (Pima Co.,AZ)	EQL-0995-109	109
Hi-vol/ICAP spect. (Pima Co.,AZ)	EQL-0995-110	110
Hi-vol/ICAP spect. (Rhode Island)	EQL-0888-068	068
Hi-vol/ICAP spect. (Silver Val. Labs)	EQL-1288-070	070
Hi-vol/ICAP spect. (West Virginia)	EQL-0694-096	096
Hi-vol/WL-disp. XRF (CA A&IHL)	EQL-0581-052	052
PM_{10} Samplers		
Andersen Instruments,RAAS10-100	RFPS-0699-130	130
Andersen Instruments,RAAS10-200	RFPS-0699-131	131
Andersen Instruments,RAAS10-300	RFPS-0699-132	132
BGI Model PQ100	RFPS-1298-124	124
BGI Model PQ200	RFPS-1298-125	125
Oregon DEQ Medium volume sampler	RFPS-0389-071	071
Rupprecht & Patashnick Partisol 2000	RFPS-0694-098	098
R & P Partisol-FRM Model 2000	RFPS-1298-126	126
R & P Partisol-Plus Model 2025 Seq.	RFPS-1298-127	127
Sierra-Andersen/GMW 1200	RFPS-1287-063	063
Sierra-Andersen/GMW 321-B	RFPS-1287-064	064
Sierra-Andersen/GMW 321-C	RFPS-1287-065	065
Sierra-Andersen/GMW 241 Dichot.	RFPS-0789-073	073
W&A/Thermo Electron Mod 600 HVL	RFPS-1087-062	062
PM_{10} Analyzers		
Andersen Instruments Beta FH62I-N	EQPM-0990-076	076
Met One BAM1020, GBAM1020, BAM1020-1, GBAM1020-1	EQPM-0798-122	122
R & P TEOM 1400, 1400a	EQPM-1090-079	079
W&A/Thermo Electron 650 Beta Gauge	EQPM-0391-081	081
$PM_{2.5}$ Samplers		
Andersen Model RAAS2.5-200 Audit	RFPS-0299-128	128
BGI PQ200/200A	RFPS-0498-116	116
Graseby Andersen RAAS2.5-100	RFPS-0598-119	119
Graseby Andersen RAAS2.5-300	RFPS-0598-120	120
R & P Partisol-FRM 2000	RFPS-0498-117	117
R & P Partisol-Plus 2025	RFPS-0498-118	118
Thermo Envr Model 605 CAPS	RFPS-1098-123	123
R & P Partisol 2000 Audit	RFPS-0499-129	129
TSP Manual Method		
Reference method (high-volume)	--	802